

Taxonomy

Contribution to the taxonomy of the *Terpides* lineage (Ephemeroptera: Leptophlebiidae)

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Abstract – In the present work, based on material from several localities in Brazil, we present a contribution to the taxonomy of the *Terpides* lineage, a monophyletic group of Neotropical mayflies that encompasses three genera: *Terpides*, *Tikuna*, and *Fittkaulus*. A new species of *Terpides* is described from the States of Espírito Santo and Mato Grosso, based on nymphs, male and female imagos. The male imago of the type species of *Terpides*, *T. guyanensis*, the nymph and male imago of *Tikuna bilineata*, and the nymph of *Fittkaulus cururuensis* are described for the first time.

Key words: New species / taxonomy / Neotropics / South America / macroinvertebrate

Introduction

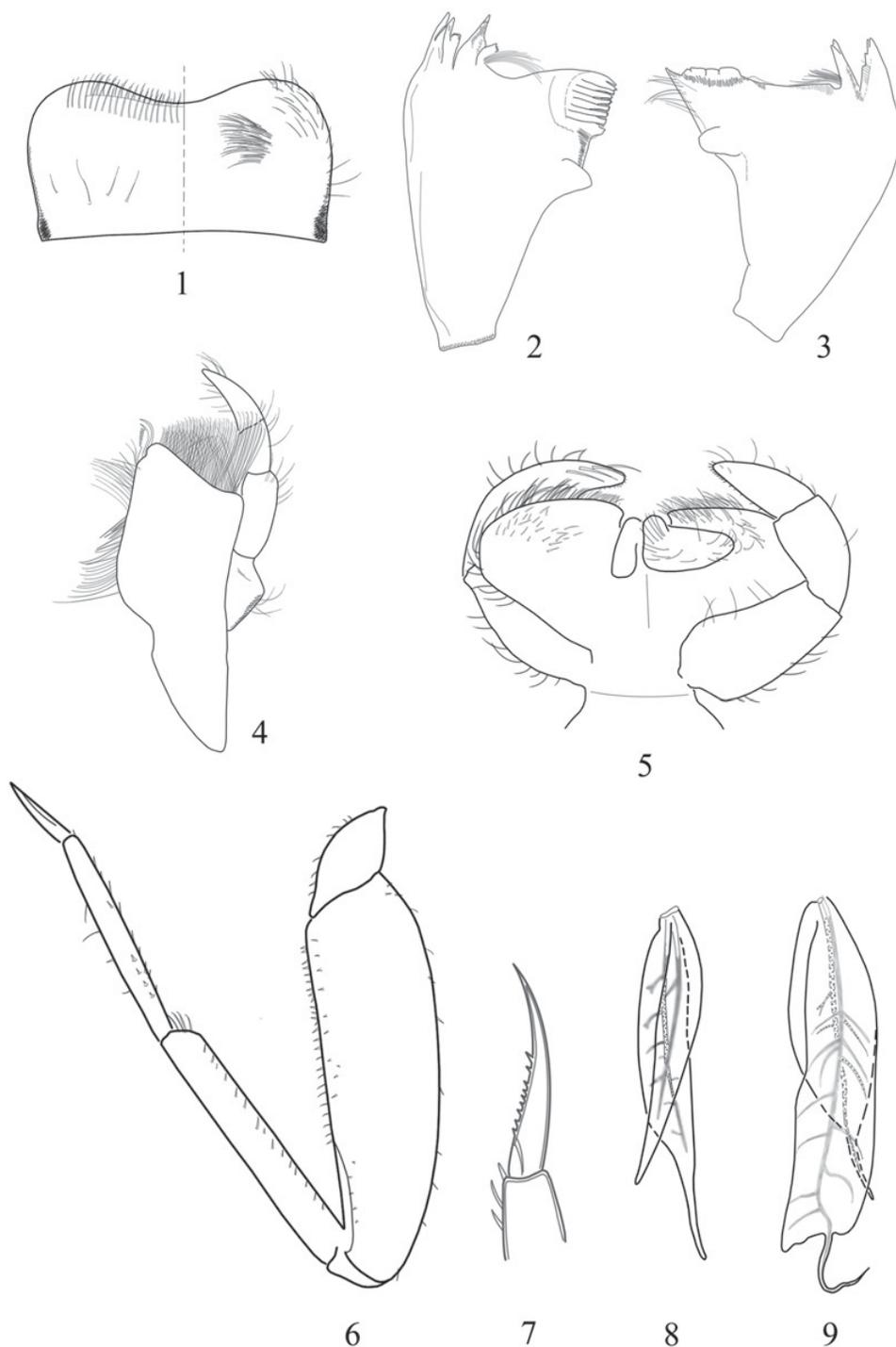
The mayfly *Terpides* lineage (Ephemeroptera: Leptophlebiidae: Atalophlebiinae) was first recognized by Savage (1986) and included the following described genera and species: *Terpides* Demoulin, represented by *T. guyanensis* Demoulin and *T. jessiae* Peters & Harrison; and *Fittkaulus* Savage & Peters, represented by *F. maculatus* Savage & Peters, *F. cuiabae* Savage, and *F. cururuensis* Savage. Later, a new species of *Terpides*, *T. diadema*, was described by Lugo-Ortiz and McCafferty (1996), the morphology of the nymphs of *T. jessiae* and *T. guyanensis* was compared (Boutonnet *et al.*, 2004), and a new genus, *Tikuna* Savage, Flowers & Porras, was described based on a single species, *T. atramentum* (Traver), and incorporated to the *Terpides* lineage (Savage *et al.*, 2005). Peters *et al.* (2005) complemented the current knowledge of the *Terpides* lineage, transferring *Choroterpes bilineata* Needham & Murphy to *Tikuna*, and *C. vinculum* Traver to *Terpides*. To date nine species and three genera are recognized in the *Terpides* lineage.

Terpides is not only the most speciose genus in the lineage, but also presents the widest distribution, being known from Central America (*T. diadema* and *T. vinculum*,

both from Costa Rica), West Indies (*T. jessiae*, from Martinique), and South America (*T. guyanensis*, from Surinam and French Guyana, as well as undescribed species mentioned by Dominguez *et al.* (2006) from Argentina, Bolivia, Brazil, Colombia and Ecuador) (Demoulin, 1966; Peters and Harrison, 1974; Lugo-Ortiz and McCafferty, 1996; Boutonnet *et al.*, 2004); *Fittkaulus* is mainly known from Brazil (all described species), but undescribed species are also recorded from Surinam, French Guyana, Peru and Ecuador (Savage, 1986; Dominguez *et al.*, 2006); whereas *Tikuna* is reported from Central and South America (*T. atramentum* from Costa Rica, and *T. bilineata* from Ecuador, Surinam, Venezuela, Colombia and Brazil) (Peters *et al.*, 2005; Savage *et al.*, 2005).

During the last years, we have collected material from the *Terpides* lineage from several and poorly documented areas of Brazil. Based on this material, and aiming to complement the current knowledge of this group of mayflies, in the present paper a new species of *Terpides* is described from the States of Espírito Santo and Mato Grosso, based on nymphs, male and female imagos. The male imago of the type species of *Terpides*, *T. guyanensis*, the nymph and male imago of *Tikuna bilineata*, and the nymph of *Fittkaulus cururuensis* are described for the first time.

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Figs. 1–9. *Fittkaulus cururuensis*, nymph. 1, Labrum (left-dorsal; right-ventral). 2, Left mandible. 3, Right mandible. 4, Maxilla. 5, Labium (left-dorsal; right-ventral). 6, Foreleg. 7, Tarsal claw. 8, Gill 1. 9, Gill 4.

The material examined is housed in the following institutions: Entomological Collection of the Universidade Federal do Espírito Santo, Vitória, Brazil (UFES), Entomological Collection of the Universidade Estadual de Mato Grosso Nova Xavantina, MT, Brazil (UNEMAT) and Invertebrate Collection of the Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA).

Taxonomy

Fittkaulus cururuensis Savage (1986) (Figs. 1–9 and 30–31)

Savage (1986): 286 (female); Dominguez *et al.* (2002): 462; Dominguez *et al.* (2006): 380; Lopes *et al.* (2007): 141.

Description

Nymph

Length: body: 5.8–6.3 mm, cerci: 4.0 mm.

Head (Fig. 30): brown, inner margin of eyes and triangular mark below ocelli yellow. Vertex with irregular yellow spots. Antennae whitish. Base of ocelli black, apex whitish.

Labrum (Fig. 1): length about 2.3× maximum width, anteromedial emargination without denticles; dorsally with one nearly marginal row of fine, simple setae, and one submarginal row of long, fine, simple setae, and long, fine, simple setae scattered on basal half; ventrally with long, fine, simple setae on antero-sublateral area and on anterolateral corner.

Left mandible (Fig. 2): outer margin relatively straight; basal set of incisors with three main denticles, distal set with four; prostheca with numerous long bristles.

Right mandible (Fig. 3): outer margin broadly curved; basal set of incisors with two main denticles, distal set with four; inner margin with distomedial row of long, simple setae.

Hypopharynx (as in Fig. 25): lingua rectangular without lateral processes, superlingua with inner margin with row of setae.

Maxilla (Fig. 4): apex of galea-lacinia with one large, pectinate setae and one long, non-pectinate, curved setae; inner lateral margin with row of long, simple setae; palp segment II 2.1× length of segment I; palp segment III 0.6× length of segment II; palp segment IV 1.5× length of segment III.

Labium (Fig. 5): palp segment II 0.6× length of segment I; palp segment III subequal length to segment II; segment I with fine, long, simple setae scattered on inner and outer margins; segment II with two fine, simple setae on outer margin; segment III conical with spine-like setae on inner margin, and fine, long, simple setae scattered on outer margin, dorsally with oblique row of large setae; paraglossa and glossa with scattered setae; glossa curved over ventrolaterally, large; paraglossa broadly rounded laterally.

Thorax (Fig. 31): brown. Pronotum with lateral margin yellow; mesonotum with yellow marks; metanotum with posterior margin yellow. Sternum yellow. Pleura yellowish white.

Legs (Fig. 6): femora yellowish white, subdistal area brown; coxae II and III with brown mark; tibiae and tarsi yellowish washed with brown; forefemora with marginal and submarginal inner rows of short, fine, simple setae, outer margin with scattered fine, simple setae; foretibiae with inner row of simple setae, and with four long, fine, simple setae near apex; foretarsi with two rows of fine, simple setae on inner margin, outer margin with scattered fine, simple setae; tarsal claw with nine denticles (Fig. 7).

Abdome (Fig. 31): tergum yellow washed with brown; terga II–VII with sublateral yellow mark; terga VIII with median area yellow; posterior 2/3 of terga IX yellow;

terga X yellow. Posterolateral projections present on terga II–VI and VIII–IX (shorter on segment II, regular on segments III–VI, larger on segments VIII–IX). Sternum yellow; sterna II and III with sublateral brown mark. Gills with tracheae blackish; ventral portions of gill I lanceolate, dorsal portions with narrow projection (Fig. 8); gill IV with dorsal and ventral portions dissimilar, dorsal portion large, distal margin with large inner lobe, ventral portion as in gill I (Fig. 9). Cerci yellow, basal area brown.

Adults

The female imago of this species was adequately characterized by [Savage \(1986\)](#), whereas the male imago remains unknown.

Diagnoses

Nymphs of *F. cururuensis* are distinguished from those of *F. maculatus*, the other species of the genus described in the nymphal stage, by the following combination of characteristics: (1) labrum with anteromedian emargination without denticles (Fig. 1); (2) apex of galea-lacinia with one large, pectinate setae and one large, non-pectinate, curved setae (Fig. 4); (3) coxae II and III with brown mark; (4) tergum yellow washed with brown, terga II–VII with sublateral yellow mark, terga VIII with median area yellow, posterior 2/3 of terga IX yellow (Fig. 31).

Female imagos of *F. cururuensis* are distinguished from other species of the genus by the following combination of characteristics: (1) fore wing without a dark macula at fork of vein MA; (2) coxae I and II, or II and III with brown mark; (3) abdominal sterna 1–2 with small posteromedian brownish black marks.

Distribution

Brazil: Mato Grosso, Pará, Espírito Santo.

Material examined

Brazil: Espírito Santo, Sooretama, Reserva Biológica de Sooretama, Quirininho stream, S 20°39'22", W 40°50'13", 15.vii.2008, F.F. Salles and R. Boldrini col., 10 nymphs, one female imago. Brazil: Mato Grosso, Barra do Garças, Córrego da Mata, S 14°29'51.7", W 52°28'42.6", 9.viii.2005, H.R.S. Cabette col., three nymphs. One nymph, same locality, except S 14°59'25.2", W 52°27'57.7" and 09.i.2005. Three female imago, same locality, except S 14°59'25.2", W 52°27'57.7" and 14.xi.2005, UFES.

***Terpides guyanensis* Demoulin (1966) (Figs. 36–37, 41 and 44–45)**

Demoulin (1966): 17 (nymph); Hubbard (1982): 266; Savage and Peters (1978): 296; Boutonnet *et al.* (2004): 96; Dominguez *et al.* (2006): 487.

Description*Nymph*

The nymph of this species, previously described by Demoulin (1966), was adequately characterized by Boutonnet *et al.* (2004).

Male imago

Length: body: 6.0 mm, fore wing: 5.2 mm, hind wing: 0.9 mm.

Head (Figs. 36 and 37): brown. Upper portion of eyes grayish brown, stalk brown. Scape and pedicel dark brown; flagelum whitish. Base of ocelli whitish, apex black.

Thorax (Figs. 36 and 37): pronotum light brown, margins brown; mesonotum dark brown, posterior scutal protuberance and scutellum darker; metanotum brown. Pleura brown washed with black. Sternum brown.

Wings (Figs. 44 and 45): longitudinal and cross veins of fore and hind wings light brown; membrane of fore and hind wings hyaline. Forefemora whitish washed with black; foretibiae whitish, apex black; mid and hind legs whitish. Tarsi and tarsal claws whitish.

Abdome (Figs. 36 and 37): terga grayish black; terga II–VIII with anteromedial grayish white mark; terga II–VIII with anteromedial light yellowish brown mark. Sternum grayish white; sterna I and II completely washed with grayish black; sterna III with anteromedian and median area washed grayish black. Styliiger plate grayish.

Genitalia (Fig. 41): forceps and penes grayish; abruptly narrowing toward apex. Caudal filaments whitish, apex of each segment grayish, fading toward apex of filaments.

Female imago

Unknown.

Diagnoses

Nymphs of *T. guyanensis* are distinguished from other species of the genus by the following combination of characteristics: (1) labrum with six larger denticles; (2) gills with tracheae blackish only in part; (3) posterolateral projection on terga V–VI and VIII–IX.

Imagos of *T. guyanensis* are distinguished from other species of the genus by the following combination of characteristics: (1) upper portion of eyes grayish brown (Figs. 36 and 37); (2) fore wing hyaline (Fig. 44);

(3) genitalia with penes abruptly narrowing toward apex (Fig. 41).

Distribution

Brazil: Roraima, Surinam, French Guyana.

Material examined

Brazil: Roraima, Igarapé do Pedral, Serra de Tepequém, N 3°37'14.43", W 61°38'15.34", 26.xi.2006, J.N. Falcão col. Two male imagos (one reared with corresponding exuvia mounted on slide), INPA.

Terpides sooretamae* Boldrini and Salles, sp. n. (Figs. 10–21, 32–33, 38, 42 and 46–49)*Description***Nymph*

Length: body: 5.1–7.4 mm, cerci: 6.8 mm.

Head (Fig. 32): brown. Vertex with irregular light brown marks; triangular light yellowish brown mark below ocelli. Antennae whitish. Inner margin of compound eye yellowish white. Upper portion of compound eye grayish black.

Labrum (Fig. 11): length about 2× maximum width; anteromedial emargination with six poorly defined denticles (Fig. 10); dorsally with one nearly marginal row of fine, simple setae, and one submarginal row of long, fine, simple setae, and with long, fine, simple setae scattered on basal half; ventrally with long, fine, simple setae on antero-sublateral area and on anterolateral corner.

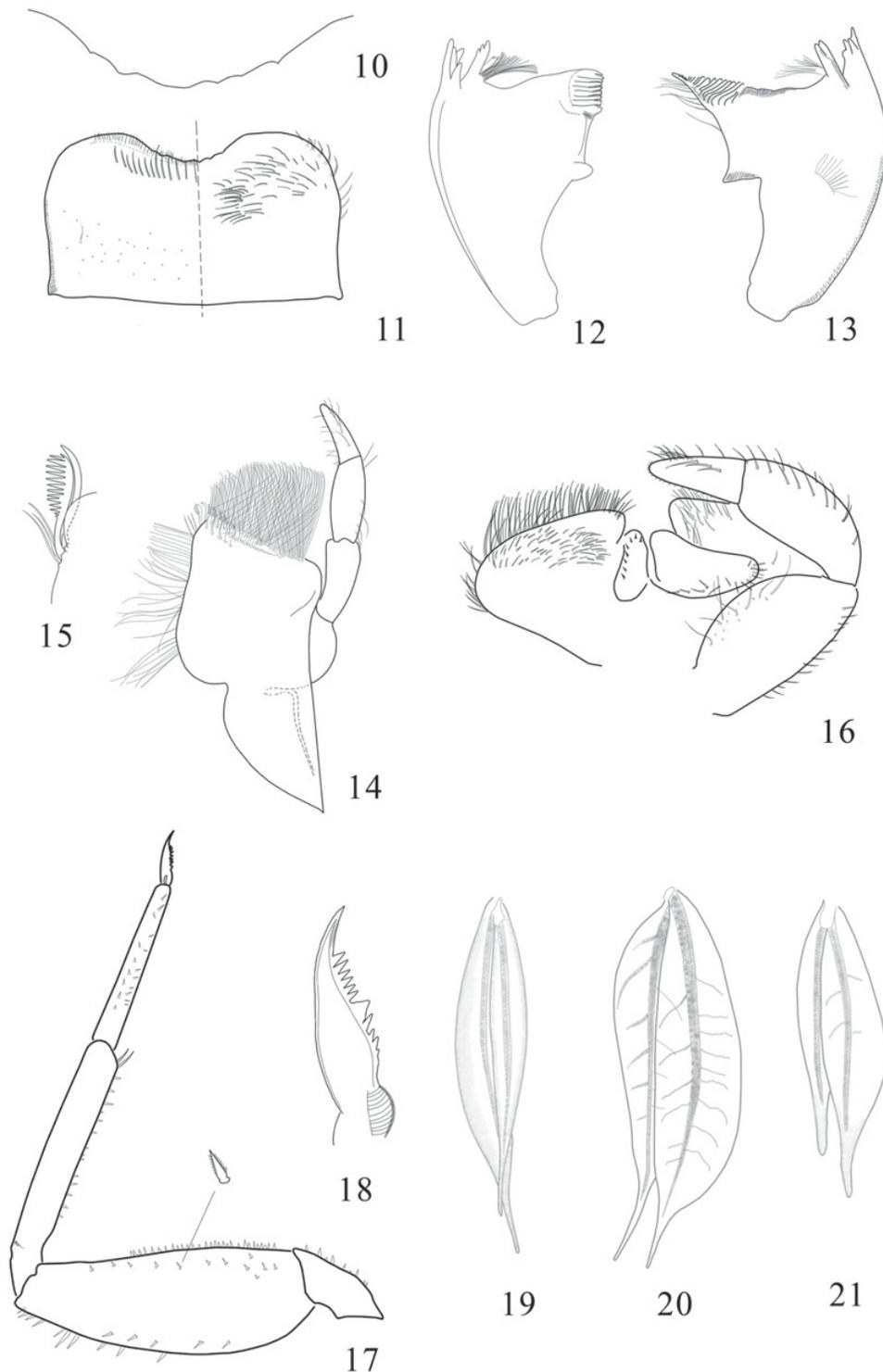
Left mandible (Fig. 12): outer margin broadly curved; basal set of incisors with three main denticles, distal four; prosthema with numerous long bristles.

Right mandible (Fig. 13): outer margin broadly curved; basal set of incisors with two main denticles, distal set with four; inner margin with distomedial row of long, simple setae, central area of the mandible, with row of setae.

Hypopharynx (as in Fig. 25): lingua rectangular without lateral processes, superlingua with inner margin with row of setae.

Maxilla (Fig. 14): apex of galea-lacinia with one large, pectinate setae and one long, non-pectinate, curved setae (Fig. 15), and row of five pectinate setae; inner lateral margin with row of long, simple setae; segment II with palp segment II 2.5× length of segment I; palp segment III subequal of segment II; palp segment IV 0.7× length of segment III.

Labium (Fig. 16): palp segment II 0.7× length of segment I; palp segment III 0.6× length of segment II; segment I with fine, long, simple setae scattered on inner and outer margin; segment II with row of fine, simple setae



Figs. 10–21. *Terpides sooretamae*, nymph. 10, Detail of anterior margin of labrum. 11, Labrum (left-dorsal; right-ventral). 12, Left mandible. 13, Right mandible. 14, Maxilla. 15, Detail of pectinate setae of Maxilla. 16, Labium (left-dorsal; right-ventral). 17, Foreleg. 18, Tarsal claw. 19, Gill I. 20, Gill IV. 21, Gill VII.

on outer margin; segment III conical with 16 spine-like setae on inner margin, and fine, long, simple setae scattered on outer margin, dorsally with a diagonal row of large setae; paraglossa and glossa with scattered setae; glossa curved over ventrolaterally, large, paraglossa rounded laterally.

Thorax (Fig. 33): pronotum light brown, anterior and posterior margins brown; mesonotum brown with yellow marks, posterior area dark brown; metanotum brown.

Legs (Fig. 17): yellow washed with brown; forefemora brown washed with black; apex of femora of mid and hind

legs brown; base of tibiae brown. Forefemora with row of 28 short, fine, simple setae on inner margin, and row of short, fine, pectinate setae on submarginal area, outer margin with scattered fine, simple setae; foretibiae with an inner row of short, simple setae, and with two long, fine simple setae near apex; foretarsi with two rows of short, fine, simple setae; tarsal claw with a larger denticle in the middle, basal set with four denticles, distal set with six denticles (Fig. 18).

Abdome (Fig. 33): tergum yellowish brown, terga I–VI completely washed with black, terga VII–VIII washed with black on anterior margin; terga II–VIII with anteromedial light yellowish brown mark. Posterolateral projections present on terga III–VI and VIII–IX (shorter on segments III–IV, larger on segments VIII–IX). Gills relatively alike, dorsal and ventral lamella lanceolate, tracheae blackish; gill I with only main trunk of trachea pigmented (Fig. 19); gill IV with many tracheoles (Fig. 20); gill VII with four tracheoles (Fig. 21). Sternum yellowish brown; sterna I, II and VII completely washed with black, sterna III–VI washed with black only on posterior margin.

Male imago

Length: body: 5.2–6.1 mm, fore wings: 6.1 mm, hind wings: 1.0 mm.

Head (Fig. 38): brown. Upper portion of eyes orange, stalk dark brown. Scape and pedicel brown; flagelum light brown. Base of ocelli black, apex light brown.

Thorax: pronotum brown, posterior margin dark brown; mesonotum dark brown, scutellum darker; metanotum brown. Pro- and mesosternum dark brown; metasternum brown. Pleura brown washed with black. Wings (Figs. 46 and 47): longitudinal and cross veins of fore and hind wings brown; cross veins of fore wing surrounded with small brown clouds; membrane of fore and hind wings grayish brown. Forefemora brown; foretibiae brownish yellow; mid and hind legs brownish yellow. Tarsus and claws whitish.

Abdome: terga brown; posterior margin of terga I–VI dark brown; terga II–VIII with anteromedial light yellowish brown mark. Sterna yellowish brown, lateral margin light brown. Styliger plate brown. Genitalia (Fig. 42): forceps: basal $\frac{1}{4}$ of segment I brown, distal $\frac{3}{4}$ light brown. Penes brown; gradually narrowing toward apex. Caudal filaments light brown, apex of each segment whitish, whitish area increasing toward apex of filaments.

Female imago

Length: body: 6.2–7.1 mm, fore wings: 7.1 mm, hind wings: 1.1 mm.

Head: light brown, with brown marks on posterior margin. Scape and pedicel brown; flagelum light brown.

Thorax: pronotum brown, with median irregular dark brown marks, posterior margin dark brown; mesonotum

dark brown, scutellum darker; metanotum brown. Pro- and mesosternum light brown; mesosternum with basisternum and furcasternum dark brown; metasternum light brown. Pleura brown washed with black.

Wings (Figs. 48 and 49): longitudinal and cross veins of fore and hind wing brown; cross veins of fore wing surrounded with small brown clouds; membrane of fore and hind wings grayish brown. Forefemora brown; foretibiae brownish yellow; mid and hind legs brownish yellow. Tarsi and tarsal claws whitish.

Abdome: as in male imago, except for lighter coloration.

Diagnoses

Nymphs of *T. sooretamae* sp. n. are distinguished from other species of the genus by the following combination of characteristics: (1) labrum with six poorly defined denticles (Fig. 10); (2) segment III of labial palp with 16 spine-like setae on inner margin; (3) gills with tracheae completely black (Figs. 19–21); (4) posterolateral projections present on terga III–VI and VIII–IX (Fig. 33).

Imagos of *T. sooretamae* sp. n. are distinguished from other species of the genus by the following combination of characteristics: (1) upper portion of eyes orange (Fig. 38); (2) cross veins of fore wings surrounded with small brown clouds (Figs. 46 and 48); (3) genitalia with penes gradually narrowing toward apex (Fig. 42).

Etymology

After the Reserva Biológica de Sooretama, one of the most important areas of conservation in the State of Espírito Santo, and one of the localities where the new species was found.

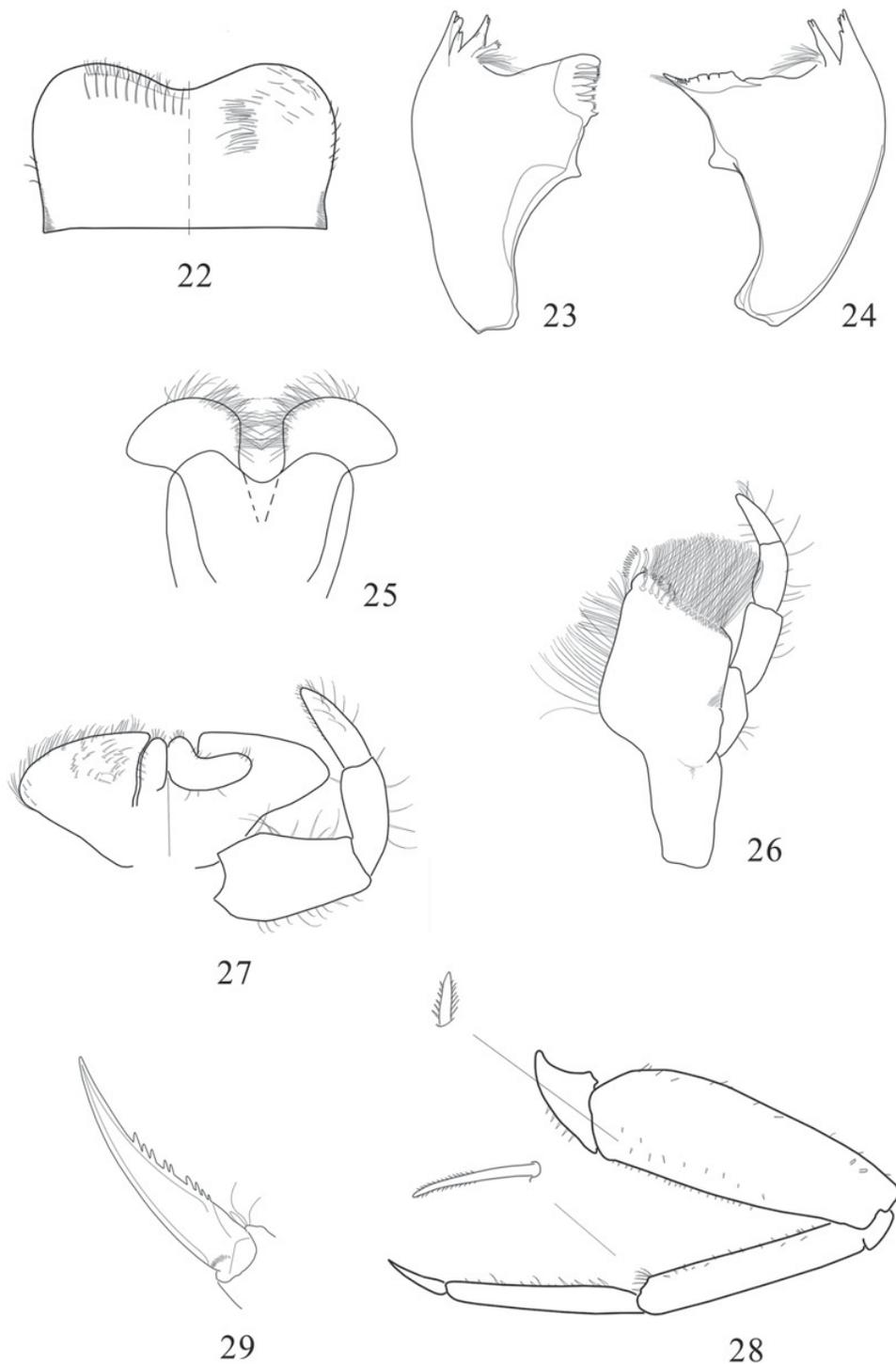
Distribution

Brazil: Espírito Santo, Mato Grosso.

Material examined

Holotype: one male imago (reared with corresponding exuvia mounted on slide). Brazil: Espírito Santo, Alfredo Chaves, Nova Mantova, S 20°39'22", W 40°50'13", 14.xii.2007, F.F. Salles and R. Boldrini col.

Paratypes: mature female nymph, same data, except 04.xi.2007 and R. Boldrini col. One nymph mounted on slides, same data from paratypes. One male imago and one female imago, same locality, except, 22.xii.2007, same collector. Brazil: Espírito Santo, Sooretama, Reserva Biológica de Sooretama, Barra Seca stream, S 20°39'22", W 40°50'13", 23.viii.2008, F.F. Salles and R. Boldrini col., six nymphs (UFES).



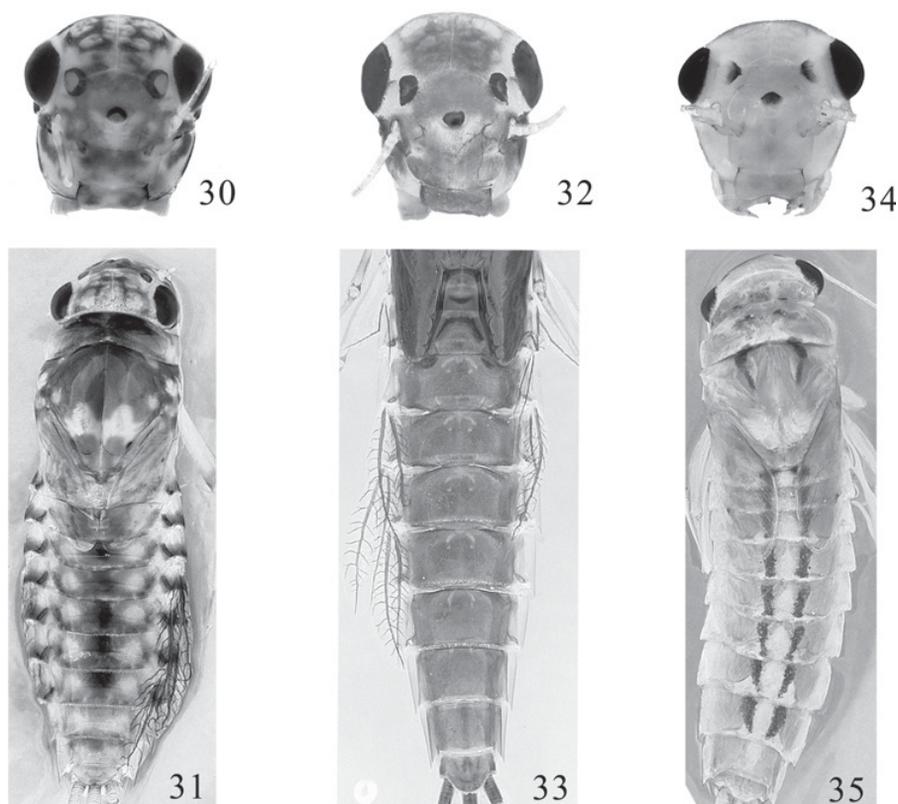
Figs. 22–29. *Tikuna bilineata*, nymph. 22, Labrum (left-dorsal; right-ventral). 23, Left mandible. 24, Right mandible. 25, Hypopharynx. 26, Maxilla. 27, Labium (left-dorsal; right-ventral). 28, Foreleg. 29, Tarsal claw.

Non type material

Brazil: Mato Grosso, Barra do Garça, Córrego da Mata, S 14°29'51.7", W 52°28'42.6", 12.i.2005, F.F. Salles col., fifteen nymphs. Five nymphs, same data, except, Y.F. Shimano and 1.viii.2007, UNEMAT.

Tikuna bilineata (Needham and Murphy, 1924) (Figs. 22–29, 34–35, 39–40, 43 and 50–51)

Choroerps bilineata Needham and Murphy (1924): 48 (male, female); Traver (1947): 156 (male, female).
Choroerps (*Choroerps*) *bilineata*; Hubbard (1982): 264.



Figs. 30–35. *Fittkaulus cururuensis*, nymph. 30, Head (frontal view). 31, General habitus of nymph (dorsal view). *Terpides sooretamae*, nymph. 32, Head (frontal view). 33, General habitus of nymph (dorsal view). *Tikuna bilineata*, nymph. 34, Head (frontal view). 35, General habitus of nymph.

Tikuna bilineata Peters *et al.* (2005): 52; Dominguez *et al.* (2006): 511; Lopes *et al.* (2007): 143.

Description

Nymph

Length: body: 5.9 mm, cerci: 5.7 mm.

Head (Fig. 34): yellowish. Antennae whitish. Ocelli whitish, inner margin of ocelli black.

Labrum (Fig. 22): length about 2.2× maximum width, anteromedian emargination without denticles, dorsally with one nearly marginal row of fine, simple setae, and one submarginal row of long, fine, simple setae; ventrally with long, fine, simple setae on antero-sublateral area and on anterolateral corner.

Left mandible (Fig. 23): outer margin relatively straight; basal set of incisors with two main denticles, distal set with four to five denticles; prosthema with numerous long bristles.

Right mandible (Fig. 24): outer margin broadly curved; basal set of incisors with two main denticles, distal set with four; inner margin with distomedial row of long, simple setae.

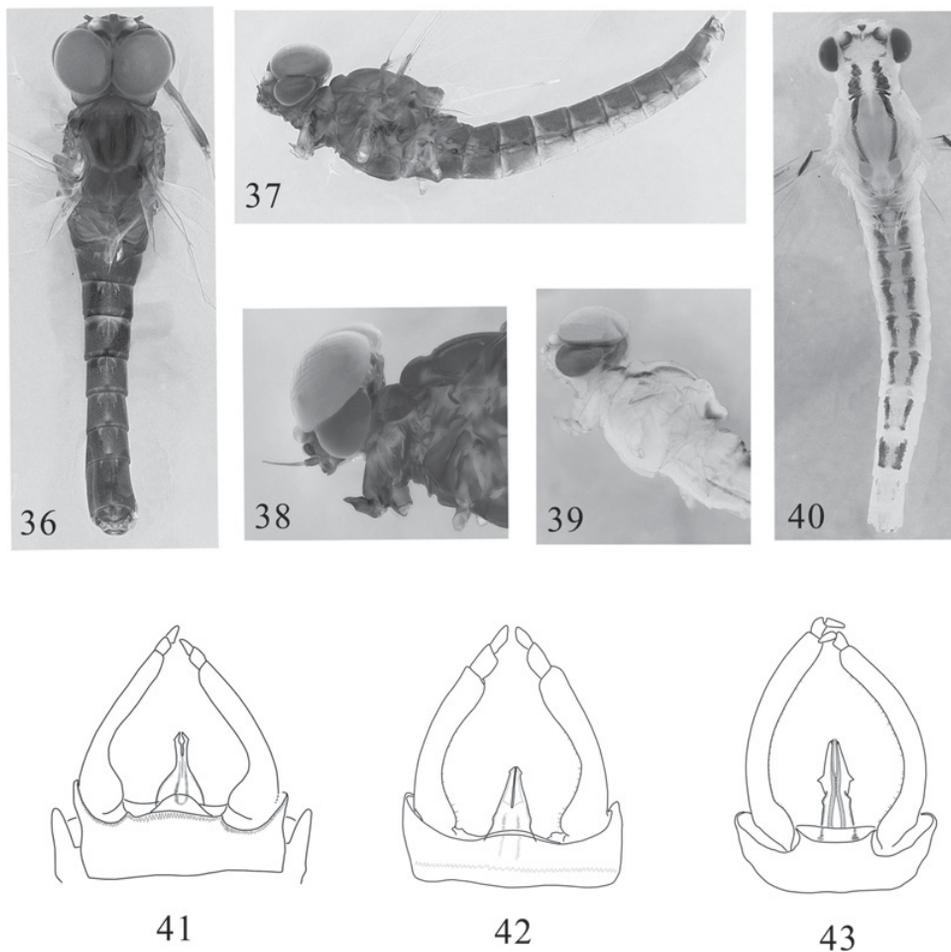
Hypopharynx (Fig. 25): lingua rectangular without lateral processes, superlingua with inner margin with row of setae.

Maxilla (Fig. 26): apex of galea-lacinia with one large, pectinate setae and one short, non-pectinate, curved setae, and row of five pectinate setae; inner lateral margin with row of long, simple setae; palp segment II 1.6× length of segment I; palp segment IV subequal to segments III and II.

Labium (Fig. 27): palp segment II 0.7× length of segment I; palp segment III subequal to segment II; segment I with fine, long, simple setae scattered on inner and outer margin; segment II with fine, simple setae scattered on outer margin; segment III conical with spine-like setae on inner margin, and fine, long, simple setae scattered on outer margin, dorsally with a diagonal row of large setae; paraglossa and glossa with scattered setae; glossa curved over ventrolaterally, large; paraglossa rounded lateral.

Thorax (Fig. 35): pro-, meso- and metanotum yellow washed with brown; pronotum with longitudinal submedial black mark; mesonotum with longitudinal submedial black mark restricted to anterior half. Pro-, meso- and metasternum light yellow.

Legs light yellow (Fig. 28): forefemora with row of 24 short, fine, simple setae on inner margin, and row of short, fine, pectinate setae on submarginal area, outer margin with scattered fine, simple setae; foretibiae with an inner row of short, simple setae, and with six long, fine, pectinate setae near to apex; foretarsi with row of fine, simple setae; tarsal claw as in Figure 29.



Figs. 36–43. *Terpidus* lineage. *Terpidus guyanensis*, male imago. 36, Dorsal view. 37, Lateral view. 41, Genitalia. *Terpidus sooretamae*, male imago. 38, Lateral view. 42, Genitalia. *Tikuna bilineata*, imagos. 39, Lateral view (male). 43, Genitalia (male). 40, Dorsal view (female).

Abdome (Fig. 35): terga yellow; segments I–VIII with longitudinal submedial black mark. Posterolateral projections present on terga VIII–IX. Sterna light yellow. Cerci yellow.

Male imago

Length: body: 5.4 mm, wings: broken and lost.

Head (Fig. 39): yellowish. Antennae light yellow. Upper portion of eyes grayish brown, basal half of stalk washed with black. Ocelli whitish, inner margin black.

Thorax (Fig. 39): yellowish. Pronotum with longitudinal submedial black mark; mesonotum darker, with longitudinal submedial black mark reaching posterior scutal protuberance, lateral area just below scutellum washed with black; metanotum yellow. Pro-, meso- and metasternum light yellow. Legs broken and lost.

Abdome: terga yellowish white, except segment X light yellow; segments I–VII with longitudinal submedial black mark. Sternum yellowish white. Genitalia (Fig. 43): yellowish; penes wanting apical spine. Caudal filaments broken-off and lost.

Female imago

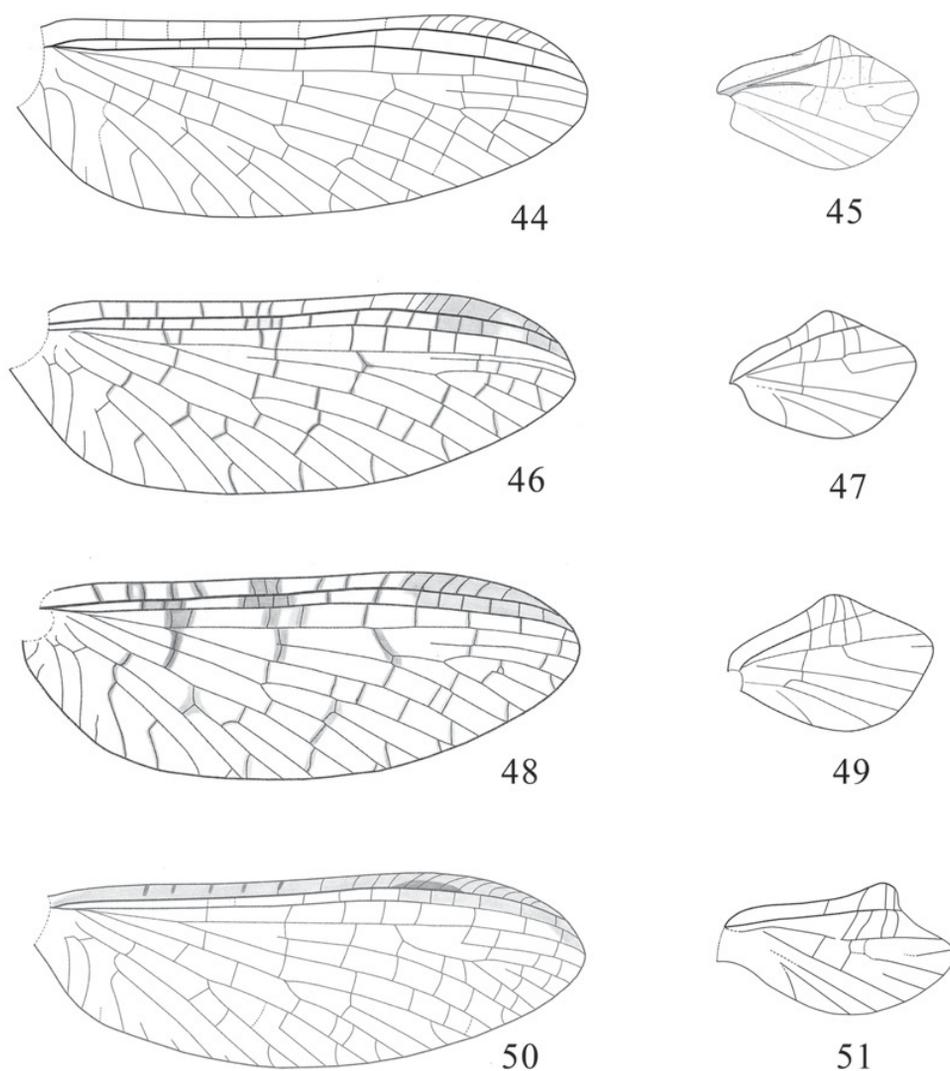
Length: body: 6.2–7.1 mm, fore wing: 7.1 mm, hind wing: 1.1 mm.

Similar to male imago, except for head yellowish with black marks between lateral ocelli and on inner margin of compound eyes (Fig. 40). Wings (Figs. 50 and 51): longitudinal and cross veins of fore and hind wings yellowish brown; membrane of fore and hind wings hyaline; costal and posterior region of subcostal veins yellowish.

Diagnoses

Tikuna bilineata is distinguished from *T. atromentum*, the other described species of the genus, by the following combination of characteristics:

Nymphs: (1) terga yellow, segments I–VIII with longitudinal submedial black mark (Fig. 35); (2) apex of tibia with pectinate setae (Fig. 28); (3) apex of galea-lacinia with one large, pectinate setae, and one short, non-pectinate, curved setae (Fig. 26); (4) posterolateral projections present on terga VIII–IX (Fig. 35).



Figs. 44–51. *Terpides* lineage, imagines. *Terpides guyanensis*, male imago. 44, Fore wing. 45, Hind wing. *T. sooretamae*, male imago. 46, Fore wing. 47, Hind wing. *T. sooretamae*, female imago. 48, Fore wing. 49, Hind wing. *Tikuna bilineata*, female imago. 50, Fore wing. 51, Hind wing.

Male imagos: (1) terga segments I–VII with longitudinal submedial black mark (Fig. 40); (2) penes wanting apical spine (Fig. 43).

Female imagos: (1) costal and posterior region of subcostal veins yellowish (Fig. 50); (2) terga segments I–VII with longitudinal submedial black mark (Fig. 40).

Distribution

Brazil: Mato Grosso, Pará; Ecuador; Surinam; Venezuela; Colombia.

Material examined

Brazil: Mato Grosso, Taquaral, S 20°39'22", W 40°50'13", 19.i.2005, H.R.S. Cabette col., three nymphs

(two mounted on slides). Brazil: Pará, Munic. de Parauapebas, Flona Carajás, Serra Norte, iv.2005, N. Ferreira Jr. col., two female imagos. Brazil: Mato Grosso, Barra do Garças, Córrego da Mata, S 14°59'25.2", W 52°27'57.7", 14.xi.2005, F.F. Salles col., one male imago, UFES.

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References

- Boutonnet J., Thomas A. and Lala G., 2004. Macroinvertebrates of brooks and rivers of Martinique II. The family Leptophlebiidae: systematics, biogeography and ecological distribution [Ephemeroptera]. *Ephemera*, 4, 81–112.
- Demoulin G., 1966. Contribution à l'étude des Éphéméroptères du Surinam. *Bull. Inst. R. Sci. Nat. Belg.*, 42, 1–22.
- Dominguez E., Zuñiga M.C. and Molineri C., 2002. Estado actual del conocimiento y distribución del orden Ephemeroptera (Insecta) en la región amazónica. *Caldasia*, 24, 459–469.
- Dominguez E., Molineri C., Pescador M.L., Hubbard M.D. and Nieto C., 2006. Ephemeroptera of South America, Aquatic Biodiversity of Latin America (ABLA Series), Pensoft Sofia, 646 p.
- Hubbard M.D., 1982. Catálogo abreviado de Ephemeroptera da América do Sul. *Pap. Avulsos Zool.*, 34, 257–282.
- Lopes M.J.N., Ribeiro J.M.F. and Peiró D.F., 2007. Leptophlebiidae (Ephemeroptera) da Amazônia Brasileira. *Acta Amaz.*, 37, 139–146.
- Lugo-Ortiz C.R. and McCafferty W.P., 1996. New species of Leptophlebiidae (Ephemeroptera) from Mexico and Central America. *Ann. Limnol.*, 32, 3–18.
- Needham J.G. and Murphy H.E., 1924. Neotropical Mayflies. *Bull. Lloyd. Lib. Bot. Pharm. Mat. Med.*, 24, Entomol. Ser., 1–79.
- Peters W.L. and Harrison A.D., 1974. Redescription of *Terpides* Demoulin from St. Vincent, West Indies (Ephemeroptera: Leptophlebiidae). *Proc. Entomol. Soc. Wash.*, 76, 178–185.
- Peters J.G., Flowers R.W., Hubbard M.D., Dominguez E. and Savage H.M., 2005. New records and combinations for Neotropical Leptophlebiidae (Ephemeroptera). *Zootaxa*, 1054, 51–60.
- Savage H.M., 1986. Systematics of the *Terpides* lineage from the Neotropics: Definition of the *Terpides* lineage, methods, and revision of *Fittkaulus* Savage & Peters. *Spixiana*, 9, 255–270.
- Savage H.M. and Peters W.L., 1978. *Fittkaulus maculatus* a new genus and species from northern Brazil (Leptophlebiidae: Ephemeroptera). *Acta Amaz.*, 8, 293–298.
- Savage H.M., Flowers R.W. and Porras V.W., 2005. Rediscovery of *Choroaterpes atramentum* in Costa Rica, type species of *Tikuna* new genus (Ephemeroptera: Leptophlebiidae: Atalophlebiinae), and its role in the “Great American Interchange”. *Zootaxa*, 932, 1–614.
- Traver J.R., 1947. Notes on Neotropical mayflies. Part II. Family Baetidae, subfamily Leptophlebiinae. *Rev. Entomol.*, 18, 149–160.